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ANALYSIS OF PUBLIC PERCEPTION OF OIL SPILL DISASTERS AFFECTING MARINE ENVIRONMENT: A CASE STUDY IN ÇEŞME-IZMIR

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ABSTRACT

It has widely been an undeniable fact that oil spill has a destructive impact on the health of all inhabitants both on land and in sea. Significantly, oil spill that directly affects the residents exposed to plenty of hazards is likely to cause certain social upheavals and prevalent concerns. This study aims to analyze the socio-economic effects of oil spill on the residents of the region caused by M/V Lady Tuna, as a result of an accident encountered in Cesme/Izmir on Dec.18.2016. The analysis covers the perceptions of the residents in Cesme. The Turkish version of a scale developed by Safford et. al. (2012) has been used for data collection instrument. The sample of the study (n=326) has been determined by a quota sampling method in Cesme. The data collected from the residents have been evaluated by means of frequency and logistics regression analyses. Findings show that the residents of Cesme have an overall view/idea about the pollution, and they are aware of the responsibilities of different related parties of oil spill disaster and possible effects of it.

Keywords: Coastal Management, Logistics Regression, Oil Spill Disaster, Emergency Response, Public Perception.

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DENİZ ÇEVRESİNİ ETKİLEYEN PETROL KİRLİLİĞİ AFETLERİNİN TOPLUMSAL ALGISININ ANALİZİ: ÇEŞME-İZMİR ÖRNEĞİ

ÖZ

Petrol kirliliği olayları; kara ve deniz canlılarının sağlığını, bozacak olumsuz etkilere neden olmaktadır. Özellikle bölge halkını doğrudan etkileyen petrol kaynaklı deniz kirliliklerinin etkileri büyük bir sosyal tepkiyi ve endişeyi beraberinde getirmektedir. Bu çalışmada, 18.12.2016 tarihinde İzmir'in Çeşme ilçesi açıklarında kaza yapan M/V Lady Tuna gemisinin neden olduğu petrol kirliliğinin bölge halkı üzerinde oluşturduğu sosyoekonomik etkilerin analiz edilmesi amaçlanmıştır. Çalışma, Çeşme halkının kaza hakkındaki algısını ölçmeye yöneliktir. Veri toplama aracı olarak, Safford ve diğerleri (2012) tarafından geliştirilen ölçek Türkçe'ye uyarlanarak oluşturulan anket formu kullanılmıştır. Projenin örnekleme (n=326); Çeşme'de kota örnekleme yöntemiyle belirlenmiştir. Oluşturulan anket formu kullanılarak Çeşme halkından elde edilen veriler; frekans ve lojistik regresyon analizleri kullanılarak değerlendirilmiştir. Bulgular, Çeşme halkının yaşanan petrol kirliliği konusunda genel bir fikir sahibi olduğu, petrol kirliliğinin ilişkili taraflarının farklı sorumluluklarının farkında olduğu ve bu kirliliğin olası etkilerini hakkında bir fikri olduğunu göstermektedir.

Anahtar Kelimeler: Kıyı Alanları Yönetimi, Lojistik Regresyon, Petrol Kirliliği Afeti, Acil Durum Müdahalesi, Toplumsal Algı.

1. INTRODUCTION

Although there has been a decrease in the sea pollution caused by oil spills, sea pollution sourced from ships and oil platforms have recently taken an important place in technological disasters (Etkin, 2001:1291). The oil illegally discharged from ships brings about more damages to the marine environment in the long run; yet the effects of pollution resulted from voluminous accidents in a certain region and at certain periods are likely to play a lot more dramatic roles (Harahsheh; 2016:1116). Any oil-sourced sea pollution, in general, is most likely to cause serious environmental catastrophes which trigger economic and sociological problems resulting in health trouble in the region. The very first victims of such disasters are the sea inhabitants. For instance, Volgareft-248 ship accident encountered in Istanbul on Dec.29, 1999 left behind the death of around 90% of the sea inhabitants, plus 3,000 dead seagulls, ducks and extinction of brown seaweed (Öztürk and Oral, 2006; Küçükyıldız, 2014:28). Besides; fisheries are badly affected by such pollution due to tremendous damage. It is likely to cause on the eggs and the larvae of many sea inhabitants: For example, about 15,000 fishermen lost their jobs

because of the Exxon Valdez accident encountered in the USA in 1989 (Küçükıldız, 2014:17). Furthermore, oil pollution, in the long run, is most likely to cause health problems as a result of biological accumulation it causes in the food chain extending from planktons to the upper stage. Moreover, when the oil spill spreads along the coast with such environmental effects as currents and winds, the tourism industry will badly be affected, which will result in economic loss for both the residents in the region and nation on a whole. In case of such disasters, cleaning the coast is expected to overcome the major damages. Certain overestimating attitudes of the regional and national press, however, place more than likely damage on the local tourism of the polluted region, contributing to perceptions of larger scale pollution and damages (ITOPF, 2014:2).

Any increase in sea pollution brought about by oil spills could be attributed to maritime transport. In this attribution increases in the number of ships is likely to play the critical role; the greater number of ships registered in the seaborne fleet of the states the greater this risk. To avoid this risk, many states have developed their own means of preventing sea pollution (e.g.: England: SOSREP-Secretary of State's Representative; France: POLMAR-Pollution Maritime). Likewise, AFAD (Contingency Management Bureau) in Turkey has considered the accidents likely to cause oil spill as technological disasters (AFAD, 2014:28). The relevant plan developed by AFAD for the accidents causing sea pollution comprises coordinating the demands/requests for help in one center, establishing regional contingency prevention centers, centralizing public relations and keeping permanent and non-stop monitoring any likely spills and protecting the environment as well as its inhabitants (AFAD, 2014:35). Another worthwhile development in Turkey regarding this particular point is the adoption of Act Nr. 5312 involving Prevention Actions to Be Taken Against Sea Pollution Caused by Oil Spill and Other Hazardous Items and Indemnity for Loss in Case of Such Disasters. Both the Turkish Ministry of Transport and Maritime Affairs and Communication has developed both national and regional contingency plans in compliance with the above-mentioned act. Such improvement might imply that Turkey is said to be ready and alert against any likely oil spills. Still, however, any delay and/or negligence in determining the polluted area(s), keeping the spills under control and estimating the scope of the spread might endanger the success in protecting the environment (Harahsheh, 2016:1116). All in all, in fighting against pollution caused by oil spills taking actions in time and, coordinated and effective prevention play a crucial role.

2. STUDY AREA

The incident involved in the study is the environmental pollution caused by M/V Lady Tuna, IMO numbered 9453418 on Dec.18, 2016 at Cesme Ildir Gulf (at approximately 38° 23.3' N; 026 ° 25.4' E coordinates) right after she got loaded at the tuna fishery farm positioned at Izmir Gerence Gulf and collided at rocks and grounded at 1.40 p.m. The accident has been broadcast to the public through a couple of media such as the internet and press. The Information broadcast through a press conference by the mayor of Izmir and the Local Secretary of Environment and Urban Life Ministry has covered such brief points: the amount of spilled bunker form the ship as a result of the grounding is 75 m³, 62 m³ of the spilled bunker has been collected within certain barriers; the rest of the spill (12 m³) reached at such shores as Çeşme, Ilıca and Şifne due to the severe weather conditions; and the bunker left at the ship has been discharged (CBS, 2017; KAİK, 2017:4). The extent of the spill is claimed to be higher in some of the press broadcasts. According to CBS (2017), shore cleaning actions have been taken; as a result of the cleaning efforts, 991.44 tons of waste has been collected; and as per the request of various tourism companies, the seawater in the region has been analyzed, but no crude oil remnant, PAH (Polycyclic Aromatic Hydrocarbon) has been detected. The overall view inferred from the broadcasts and the information released is that the spill has greatly been removed prior to the tourism season to be enjoyed in Çeşme. According to some other media, however, the negative effect of spill is to keep tremendous risk for a long time (Dirik, 2017). The relevant literature proves this pessimistic estimation (ITOPF, 2014). In fact, another point of concern is that the particular forced to sink by the cleaning efforts can rise to the surface through the force of certain currents and the increased warmth of the seawater during the summer season.

The main aim of this study is to analyze the social perceptions regarding the oil spill caused by M/V Lady Tuna accident encountered at the shore of İzmir-Çeşme. This analysis is to involve an evaluation from the point of the residents of the region concerning the actions taken by the ship authority, local authority and the top management. In a sense, the analysis aims to disclose how the particular accident, thus the population, has affected and changed the psychosocial perceptions and attitudes of the society. Besides, particularly the views and expectations of those who have most negatively been affected by the pollution and thus claim for certain compensation have been subject to the analysis with a further focus. In a sense, this study has also aimed to reveal the primary sources that play important roles in informing the society about the oil spill sourced from ships. Besides, the fact that the region where the accident has been

encountered is one of the foremost sea tourism regions, underlines the importance of the perceptions of the society affected by the accident.

3. LITERATURE REVIEW

The world as a whole including Turkey has suffered throughout the history from many sea accidents which have brought about oil spill. Based on the amount of oil spilled into the sea, some of the foremost sea accidents could be highlighted as follows: Deepwater Horizon (2010), Atlantic Empress (1979), ABT Summer (1991), Castillo De Bellver (1981) and Amaco Cadiz (1978). As a result of these accidents, approximately 1,650,000 tons of oil has spread into seas. The foremost vessel accidents having caused oil spill in Turkey are indicated in Table 1.

Table 1: The Foremost Vessel Accidents Encountered in Turkey

Accident Date	Vessel Name	Location	Accident Type	Oil Spill Quantity (Tons)
14.12.1960	WORLD HARMONY	Istanbul	Collision and fire	22.000
15.11.1979	INDEPENDENTA	Istanbul	Collision and fire	94.000
13.10.1982	UNIREA	Istanbul	Explosion and foundering	66.400
13.03.1994	NASSIA	Istanbul	Collision and fire	13.500
13.02.1997	TPAO	Istanbul	Fire at shipyard	1.500
29.12.1999	VOLGANEFT 248	Istanbul	Grounding and flooding	1.300
06.10.2002	GOTIA	Istanbul	Contact with a fixed object	18
11.12.2003	SVYATOV PANTELEYMON	Istanbul	Grounding	230
19.01.2010	ORÇUN C	Istanbul	Grounding and flooding	125
18.12.2016	LADY TUNA	Çeşme	Grounding	130

Source: Compiled by authors from internet news

The relevant literature review reveals that while the number of the foremost accidents having caused pollution (>700 tons) was 245 by 1970s this number fell down to 12 in 2010s (ITOPF, 2017:03). The most important causes of this decrease have definitely been the scientific researches on these accidents as well as the technological advances. Some of the relevant researches are indicated in Table 2.

Table 2: Some Examples of Scientific Researches on Marine-based Oil Spill

Author(s)	Name of the Study	Sample
Ritchie (1995)	Maritime Oil Spills - Environmental Lessons and Experiences with Special Reference to Low-Risk Coastlines	-
Safford et al. (2012)	Public perceptions of the response to the Deepwater Horizon oil spill: Personal experiences, information sources, and social	2023 participants
Mong et al. (2012)	Immediate Psychological Impact of the Deepwater Horizon Oil Spill: Symptoms of PTSD and Coping Skills	580 participants
Kim et al. (2014)	Social and ecological impacts of the Hebei Spirit oil spill on the West coast of Korea: Implications for compensation and	15 cities
Gill et al. (2014)	The Exxon and BP oil spills: a comparison of psychosocial impacts	812 participants
Smith et al. (2014)	Local volunteers respond to the Rena oil spill in Maketū, New Zealand	Interview with 11
Rung et al. (2016)	Depression, Mental Distress, and Domestic Conflict among Louisiana Women Exposed to the <i>Deepwater Horizon</i> Oil Spill in the WaTCH Study	2842 participants

Source: Compiled by authors.

Gill et al. (2014), one of those who have studied the oil spill sourced disasters and their effects on the relevant communities; have adopted research carried out in 1990 on the psychosocial effects of Exxon Valdez accident on the residents of the region. Mong et al. (2012) have conducted research through 588 participants to reveal the psychological effects of Deep Water Horizon disaster on the victims. Smith et al. (2014) have disclosed through their research how the oil spill encountered on Nov. 21, 2011, in New Zealand had affected the local residents and how cleaning efforts had been successful. The common point of these three studies is that they all have defined oil spill as a technological disaster. Kim et al (2014) have conducted research on the oil spill encountered in Korea in 2017 and aimed to reveal whether the indemnity incurred to compensate the environmental and sociological loss has been justifiable enough despite a long time has passed since the accident. Rung et al. (2016) have carried out medical research on Deep Water Horizon disaster. This study, conducted through 2,842 women resided in Louisiana, has aimed to uncover the effects of the accident on women. Ritchie (1995) has adopted an approach based on geographical information systems and focused on the importance of effective information flow in combating oil spills sourced from sea accidents. Besides, Ritchie has underlined the importance of rapid and effective interference in such mishaps. Safford et al. (2012) have conducted a questionnaire via telephone through 2,023 persons most affected by the oil spill caused by DeepWater Horizon, aiming to reveal the perceptions of the residents regarding the attitudes and reactions of the

local and federal authorities. The questionnaire developed by Safford et al. (2012) has been adapted to the oil spill encountered in Çeşme and used in this study aiming to scrutinize the perceptions of the residents regarding the actions taken against the oil spill suffered in Çeşme by the ship authority, local authority and the central authority, and thus determine the overall social perception.

The reason for the academic studies regarding the marine accidents is mainly to determine the frequency and causes of accidents and to take the necessary precautions to prevent accidents that may occur afterward (Asyalı and Kızıkan, 2012). Moreover, Determination of oil distribution after ship accidents and it is very important to predict the subsequent movement. Early and correct intervention will be beneficial in minimizing environmental pollution (Başar, 2010). Nevertheless, after having deep content analysis on the related literature, the main motivation of this study occurred. According to the overall motivations stated in previous studies, the main motivation of this study is to understand the public perceptions towards the oil spill disasters. The authors wonder if the oil spill disaster makes sense for the public and the efforts performed by the related parties differ on these perceptions.

4. METHODOLOGY

In this study, a thorough literature review, case study methods and both qualitative, as well as quantitative research instruments, have been used. By means of all these instruments, the study aims to analyze the subjective judgments, perceptions, and attitudes towards environmental pollution and the experienced disasters. To accomplish this aim, first the preliminary research questions have been determined, then the sample has been defined, and the most proper data collection instrument (a questionnaire) has been developed. Having conducted the questionnaire through the determined sample, the primary data have been collected. Then, the data collected, have been analyzed by means of binomial logistic regression analysis using SPSS 25 packaged program.

The analysis has also involved frequency and the defining statistical data resolution. The data gained have been subject to a thorough comparative comprehension involving the relevant literature. The overall methodology is detailed in such three sub-chapters as ‘data collection instrument’, ‘sampling’ and ‘logistic regression analysis’.

4.1. Data Collection Instrument

As the data collection instrument, a questionnaire comprising three sections and 48 questions (15+15+18) has been developed. The first section is on the profile of the participants; the questions in the second section aim to reveal the extent of awareness regarding the marine environment, the third section focuses on oil spill. The contents of the questionnaire have been based on the research carried out by Safford et al. (2012) on the oil spill disaster caused by BP Deepwater Horizon. The questionnaire used in the mentioned study has been translated into Turkish and adapted to the specifications of the case to be used in this study. The adapted form submitted to the scholars who have an academic background in the subject, on Feb. 28, 2017, through Apr. 10, 2017, has been discussed and final version has been formed in compliance with the overall evaluation of the said scholars from such disciplines as maritime education and training, marine transportation engineering, sea products, environmental engineering, and sociology.

The final form of the questionnaire has been conducted, as an initial trying step, through 200 residents of Çeşme over 18 years old and homogenously composed of male and female. The aim of this initial testing conduction is to discover any likely incomprehensibilities and/or ambiguities. Following this pilot conduction and taking the determined discordances into consideration, the questionnaire has been revised and reformed to get put into actual conduction.

4.2. Sampling

According to the statistics released by the Turkish Statistics Institution (TUIK) for 2017, the number of residents in Çeşme is 40,352. The population for this research covers 32,152 residents (around 80% of the total residents) who are over the age of 18. In determining the sample, probabilistic and non-probabilistic methods are used in scientific studies. The latter covers three types: convenience, judgmental and quota (Kinnear and Taylor, 1996:412). In this research, district-based 1% of quota type has been chosen, which has been conducted, considering equality between male and female and the sample has comprised 326 residents.

4.3. Logistic Regression Analysis

The focus of this analysis is to determine the group in which individuals take place (Çokluk, 2010). Besides, through this analysis, the likely effects of the variables on the dependent variables could be

determined (Özdamar, 2012:471). Through this approach, odds values could be gained, the ratio of the likelihood of an incident under analysis to the likelihood of another incident. The odds ratio reveals the effects of the likelihood of an incident to the likelihood of it to take place, which makes it possible to determine the percentage of being observed (Gujarati, 1999). In this analysis, normal or permanent distribution is not a must; nor are independent variables to be categorical while dependent and independent variables are stated in numbers. In many socioeconomic kinds of research that aim to determine the relationship between causes and results, data is collected in two-fold forms such as 'negative-positive', 'successful-unsuccessful', 'yes-no', 'satisfied-dissatisfied' (Girginer and Cankuş, 2008). This approach has been used in this study, and the participants who think the action taken to the oil spill is 'perfect' and 'good' have been quoted to be 1, while those who think the action is 'ordinary' and 'weak' have been quoted to be 0.

With logistics regression analysis, the relationships between finding the related parties' efforts satisfactory and stated independent variables were examined and the results were listed. In accordance with the logistics regression analysis, findings have been given with the help of detailed tables. In these analyses, the group of people who thinks the related parties' efforts satisfactory remained dependent variables since the probability of this is strongly dependent to the other stated independent variables.

5. FINDINGS

The findings of this study are two-fold. The first section comprises the frequency data concerning the follow-up questions and the profile of the participants. The second section covers the choice of variables for the logistics regression model and the result of the model.

The profile specifications of the participants and the follow-up frequencies comprise the age, gender, residence district, status, income, and employment. All these specifications are indicated in Table 3.

Table 3: Profile Specifications of the Participants

VARIABLES	n	%			
Gender					
▪ Male	165	50.6			
▪ Female	161	49.4			
Total	326	100			
Marital Status					
▪ Married	127	39			
▪ Single	199	61			
Total	326	100			
Job Status					
▪ Full time	121	37.1			
▪ Part-time	22	6.7			
▪ Self-employed	43	13.2			
▪ Retired	44	13.5			
▪ Unemployed	9	2.8			
▪ Housewife	10	3.1			
▪ Disabled employee	1	0.3			
▪ Student	76	23.3			
Total	326	100			
VARIABLES	n	Min.	Max.	Mean	St. Dev.
Age	326	18	80	33.13	14.64
Period of residence (Years)	326	1	70	12.75	13.42
Monthly Income (TL-Turkish Liras)	326	500 TL	20,000 TL	4,508 TL	2,957

VARIABLES	n	%
Type of residency		
▪ Continuous	140	42.9
▪ Seasonal	186	57.1
Total	326	100
Willingness to live in the region in the next 5 years		
▪ Yes	288	88.3
▪ No	38	11.7
Total	326	100
Education		
▪ Primary	40	12.3
▪ High school	147	45.1
▪ Associate	31	9.5
▪ Bachelor's	98	30.1
▪ Graduate	10	3.1
Total	326	100

Table 3 reveals that 50.6% (n=165) of the participants are male and 49.4% (n=161) are female, which means almost homogenous. Most of the participants (37.1%, n=121) are full time employed, 23.3% are retirees. As for the residence form, the majority are season-based residents (57.1%, n=186), and 42.9% are permanent (n=140). The average period of residence is 12.75 years and 88.3% (n=288) of them think of residing there for another 5 years. The average of the income is TL 4,508 (1 TL≈ 0,17 Euro). The average of the ages is 33.13 ranging between 18 and 80. The distribution to the districts is indicated in Table 4.

Table 4: District-based Distribution of the Participants

No	District's of Çeşme	Population Size		Sample Size		
		Over 18	Percentage (%)	Male	Female	Total
1	Altı Eylül	2,858	8.89	14	14	29
2	Alaçatı	8,264	25.70	41	41	83
3	Altinkum	107	0.33	1	1	1
4	Altinyunus	322	1.00	2	2	3
5	Ardıç	367	1.14	2	2	4
6	Boyalık.	374	1.16	2	2	4
7	Çakabey	147	0.46	1	1	1
8	Celal Bayar	540	1.68	3	3	5
9	Çiftlik	1,399	4.35	7	7	14
10	Cumhuriyet	736	2.29	4	4	7
11	Dalyan	1,731	5.38	9	9	17
12	Fahrettinpaşa	321	1.00	2	2	3
13	Germiyan	990	3.08	5	5	10
14	Ildır	578	1.80	3	3	6
15	Ilıca	952	2.96	5	5	10
16	İsmet İnönü	3,633	11.30	18	18	37
17	Karaköy	14	0.04	0	0	0
18	Musalla	3,888	12.09	19	19	38
19	Ovacık	1,614	5.02	9	9	18
20	Reisdere	1,037	3.23	5	5	10
21	Sakarya	657	2.04	3	3	7
22	Şehit Mehmet	177	0.55	1	1	2
23	Şifne	549	1.71	3	3	5
24	Üniversite	374	1.16	2	2	4
25	Yalı	523	1.63	3	3	5
	TOTAL	32,152	100.00	165	161	326

The second section of the questionnaire comprises the overall attitudes and experiences of the participants towards the marine environment which are reflected in Table 5. According to Table 5 it reveals that most of the participants (around 70 %) underline the following points as threats: too much fishing, coastal pollution, polluted sea products, and tides due to global warming. Around 50 % of them consider the quality and supply of water threatening.

Table 5: The Attitudes of the Participants Towards Marine Environment

Statements	Respondents' Selections		
	No Suffer (%)	Few Suffer (%)	Much Suffer (%)
Do you think your family or local residents have suffered from the loss of income in the fishing industry in the region in the past 5 years?	37.1	44.8	18.1
Do you think your family or local residents have suffered from Illegal, Unreported and Unregulated (IUU) fishing in the past 5 years?	51.2*	35.0	13.8
Do you think your family or local residents have suffered from water quality and pollution in the past 5 years?	17.5	21.5	61.0*
Do you think your family or local residents have suffered from the insufficient central water supply in the past 5 years?	14.7	23.6	61.7*
Do you think your family or local residents have suffered from global seasonal changes in weather in the past 5 years?	16.0	33.7	50.3*
Do you think your family or local residents have suffered from urbanizing, migration from suburb to urban in the past 5 years?	22.7	33.4	43.9
Do you think your family or local residents have suffered from unexpected weather conditions in the past 5 years?	15.3	37.4	47.2
Do you think your family or local residents have suffered from in the past 5 years?	15.6	34.4	50.0

*Marked cells shows the selections that are greater than % 50 (n>163)

Statements	Yes (%)	No (%)	No Idea (%)
Does overfishing threaten you or the other residents?	74.8*	13.8	11.3
Does coastal pollution threaten you or the other residents?	80.4*	11.7	8.0
Do fishing farms threaten you or the other residents?	54.0	22.4	23.6
Do polluted sea products threaten you or the other residents?	81.9*	8.9	9.2
Do tides in the sea threaten you or the other residents?	70.6*	19.6	9.8
Do residences along the coast threaten you or the other residents?	61.3	23.0	15.6

The third section of the questionnaire focuses on overall attitudes of the participants towards the oil spill disaster caused by M/V Lady Tuna in Cesme on Dec.18, 2016. This section reveals how much the participants are informed about the disaster along with the level of their experience and awareness of the mentioned disaster. The findings reveal that 11.7 % (n=38) of the participants are quite informed, 82.8 % (n=270) moderately informed, and 5.5 % (n=18) are very little informed. Besides, the findings indicate that more than half of the participants (56.7 % , n=185) believe that the disaster has not affected the prosperity of the residents while 10.7 % of them think that it has deeply affected the financial well-being. Furthermore, most of the participants (64.4 % , n=210) think that the disaster has damaged the environment and the nature; 18.1 % (n=59) of them think that the fishing industry has suffered from economic loss; while 17.5 % (n=57) think that the tourism industry has suffered from economic loss due to the disaster. These results have been monitored in Figure 1.

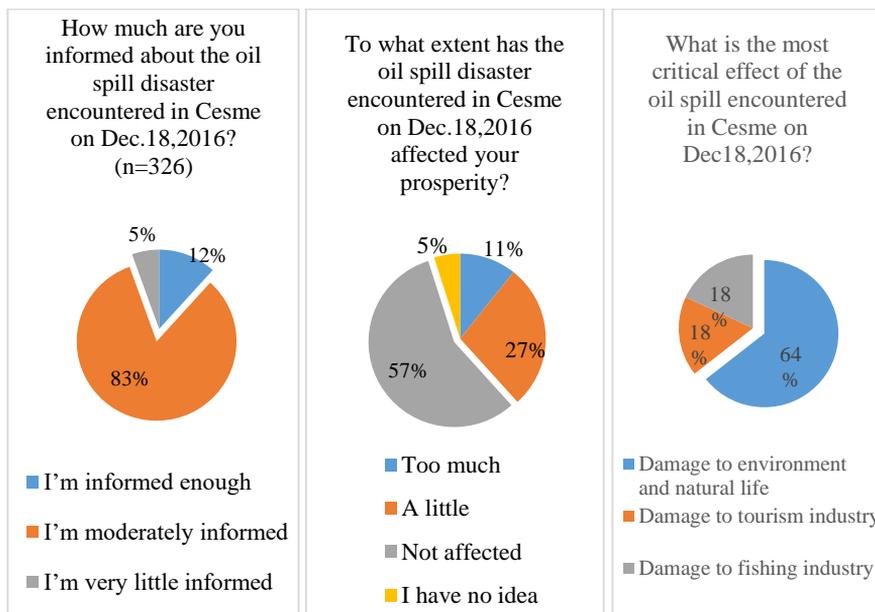


Figure 1: Level of Knowledge and Awareness of Participants

In another part of the questionnaire, participants are asked to evaluate the durations to overcome the effects of oil spill for three components; coastal areas and ecology, coastal facilities, and fishing industry. Here it should be highlighted that the general choices of the participants are grouped in “Elimination will take about over ten years” and “Will never be eliminated” selections. If the evaluation is considered group by group, %73.3 of the participants state that the elimination of

harmful effects that oil spill has given to coastal areas and ecology will take about over ten years or will not be eliminated. The percentage is 59.2 and 40.8 for fishing industry and coastal facilities respectively. Figure 2 includes the results of the analysis.

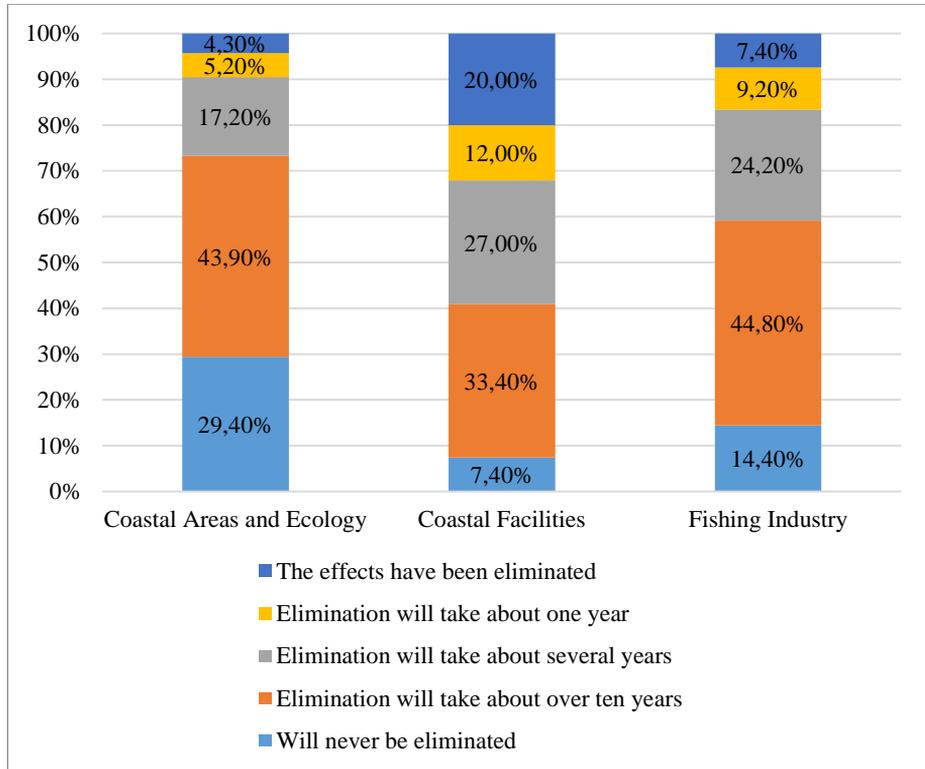


Figure 2: Opinions of Participants about Overcoming the Effects of the Oil Spill

Figure 3 reveals that the residents of Cesme trust most the information released by scientists/academicians and least the ship authority. More than half of them (55.5 %) state their trust in the information provided and actions taken by academicians. Likewise, the second highest trust seems to be in nongovernmental organizations (45.7 %). The degree of trust follows as in press (24.5 %), TV (21 %), internet (14.1 %) and the lowest (10.4 %) are in ship authority.

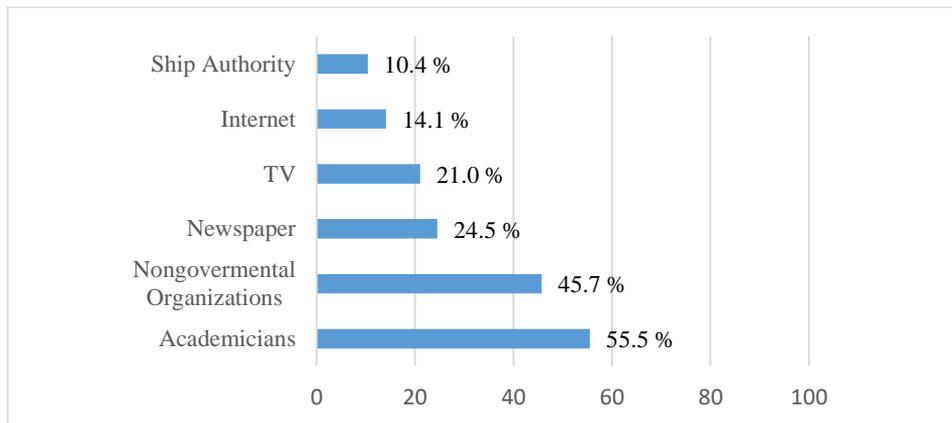


Figure 3: Opinions of Participants about the Degree of Trust in the Information Sources

The relevant part of the questionnaire requires the participants to evaluate the actions taken against the oil pollution (without making any comparison, instead of evaluating each party individually) and the results are indicated in Figure 4. The evaluation covers four choices: “excellent”, “good”, “ordinary/unexceptional”, and “poor”. The findings reveal that the evaluation regarding the actions taken by the ship authority seems to be dissatisfying: 52.7 % “ordinary/unexceptional”, and 1.5 % “excellent”. The evaluation for the actions taken by the local authority seems to be a bit better: 46.9 % “good”, the rest is “ordinary” and “poor”. The actions taken by the central authority have been found mostly “poor” (40.8 %) and partly “good” (36.5 %). The overall evaluation indicates that the number of those who find the actions taken “excellent” is rather very few. The frequency analysis has made it possible to reveal the overall view of the residents regarding oil spill, the actions taken against oil spill and the marine environment.

In addition to the frequency analysis, another analysis considering the demographic specifications of the participants is needed to reach more detailed findings. Thus the effects of such factors as the form of residing (permanent or season based), monthly income, gender age and the period (duration) of residing on the views towards taking actions (responding to) oil spill have been scrutinized. As fishing and tourism industries are means of making living for the residents in the region of the disaster, the effects of oil spill on these industries are important; therefore, whether the participants (and/or other members of their families) are involved in these industries has also been included in the research questions.

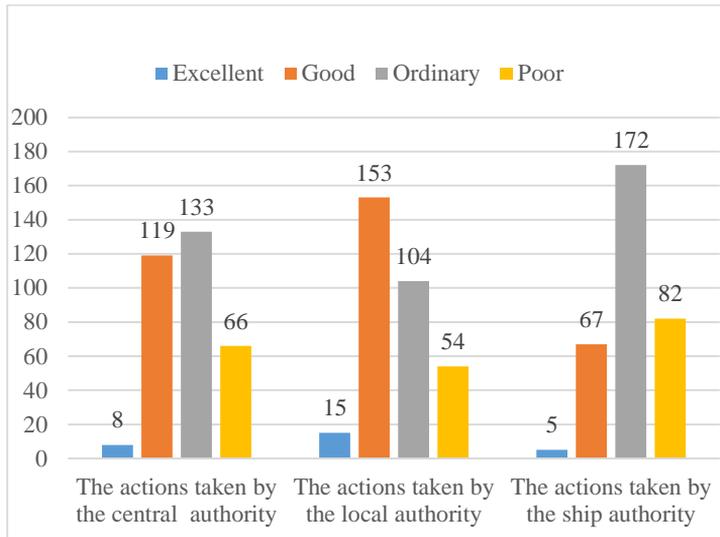


Figure 4: Opinions of Participants about Evaluating the Action Taken Against Oil Spill

In compliance with the study carried out by Safford et al (2012), binomial logistics regression analysis has been used in this study, aiming to relate the personal specifications of the participants with their perceptions of the actions taken against the oil spill. In this model, the responses of the participants have been quoted as “1” for “excellent” and “good” and “0” for “ordinary” and “poor”.

Table 6: Explanatory Variables in Meaningful Relationship with the Evaluation of the Actions Taken by the Central Authority Following the Disaster

No	Explanatory (Independent) Variables	P value
1	The effects of the disaster on the coastal businesses	.036
2	Getting affected by seawater in the last 5 years	.009
3	Getting affected by abnormal/unusual weather conditions in the last five years	.004
4	Considering the polluted sea products threatening	.005
5	Age	.039
6	Education	.014
7	Trust in the news broadcast by TV on the disaster	.005
8	Thinking of leaving Çesme after the disaster	.015

Table 7: Explanatory variables in Meaningful Relationship with the Evaluation of the Actions Taken by the Local Authority Following the Disaster

No	Explanatory (Independent) Variables	P value
1	Getting affected by illegal fishing in the last 5 years	.037
2	Getting affected by seasonal changes in the last 5 years	.030
3	Age	.029
4	Gender	.041
5	Trust in the information released by newspapers	.002
6	Trust in the views of the scientists/academicians released after the disaster	.002

The responses of the participants required to evaluate the actions taken by the local authority to the follow-up and profile questions have been subject to selection through "Backward Likelihood Ratio" method taking place in the "Binary Logistics Regression" of the SPSS 22 Software. The six variables, the p values of which are under 0.05, have been found to the proper for the basic logistics regression tests. These variables and 'p' values are indicated in Table 7. The responses of the participants required to evaluate the actions taken by the ship authority to the follow-up and profile questions have been subject to selection through "Backward Likelihood Ratio" method taking place in the "Binary Logistics Regression" of the SPSS 22 Software. The six variables the p values of which are under 0.05 have been found to the proper for the basic logistics regression tests. These variables and 'p' values are indicated in Table 8.

Table 8: Explanatory variables in Meaningful Relationship with the Evaluation of the Actions Taken by the Ship Authority

No	Explanatory (Independent) Variables	P value
1	Getting affected by seawater in the last 5 years	.023
2	Getting affected by unusual weather conditions in the last 5 years	.038
3	Considering coastal pollution, a threatening	.015
4	Income of the family	.001
5	Getting employed in the tourism service industry	.037
6	Trust in the views of the scientists/academicians about the disaster	.043

Table 9 Evaluation of the Actions Taken by the Central Authority, Local Authority and Ship Authority through Logistics Regression

Explanatory (Independent) Variables	Dependent Variables (Actions taken by...)					
	Central Authority		Local Authority		Ship Authority	
	P value	B exp.	P value	B exp.	P value	B exp.
The effects of the accident on the coastal business	.036*	.528**	.995	.998	.097	.563
Getting affected by sea water in the last 5 years	.009*	1.549**	.212	.1234	.023*	1.520**
Getting affected by unusual weather conditions in the last 5 years	.004*	.587**	.126	.747	.038*	.648**
Considering the polluted sea products threatening	.005*	.554**	.155	.737	.783	.925
Age	.039*	1.019**	.029*	1.018**	.183	1.014
Education	.014*	1.342**	.140	1.182	.142	.1228
Trust in the news broadcast by TV	.005*	1.794**	.193	1.427	.354	.1263
Thinking of leaving Çeşme, after the disaster	.015*	.403**	.177	.638	.384	.674
Getting affected by illegal fishing in the last 5 years	.759	1.061	.037*	1.432**	.735	.905
Getting affected by seasonal changes in the last 5 years	.139	1.341	.030*	1.424**	.998	.999
Gender	.891	1.038	.041*	1.647**	.470	1.251
Trust in the news broadcast by newspapers	.607	.867	.002*	1.816**	.909	.961
Trust in the views of the scientists/ academicians released about the disaster	.151	1.324	.002*	1.719**	.043*	1.560**
Considering coastal pollution threatening	.871	.961	.496	.1167	.015*	.575**
Family income	.059	.839	.792	.975	.001*	.690**
Getting employed in tourism service industry	.377	.740	.877	1.053	.037*	.378**

*These values are statistically significant ($p > 0,05$)

**These values are indicating the probability ratio of the dependent variables

After completing the backward likelihood ratio analysis, sixteen independent variables have been included in the logistics regression model and the significance values have been observed. With logistics regression

models, the relationships between finding the related parties' efforts satisfactory and stated independent variables were examined. Table 9 reveals that in the actions of the central authority and the ship authority the two independent variables, "getting affected by seawater in the 5 years" and "*getting affected by unusual weather conditions*", release meaningful results. The "*age*" variable releases meaningful results for the central authority and local authority, and the variable "*trust in the views of scientists/academicians*" releases meaningful results for central authority and the ship authority.

Logistics regression test results are as follows: The probability of the favorable views about the actions of the central authority to the disaster put forward by those who think the coastal (shore) businesses have been affected badly and recovery is never likely is 0.528 times weaker (less) than the views of those who think the effects of the disaster on these businesses have already been recovered. Likewise, the probability for those who think the illegal fishing has affected them to find the actions of the local authority satisfactory is 1,432 times weaker for those who think that they have not been affected by the disaster. The mentioned variable releases no meaningful results for the actions of the central authority and the ship authority.

The probability for those who think that the warmth of the seawater has affected them to find the actions of the central authority satisfactory is 1,549 times greater than those who think the warmth of the seawater has not affected them.

Likewise, those who have been affected by the seawater find the actions of the ship authority 1,520 times greater than those who have not been affected. This mentioned variable has no meaning full relationship with the actions of the local authority.

The probability for those who think they have been affected by unusual weather conditions to find the actions of the central authority satisfactory is 0.587 times weaker than those who think they have not been affected. Likewise, those who have been affected by the warmth of seawater find the actions of the ship authority 0.648 times less probable than those who have not been affected. This mentioned variable has no meaningful relationship with the actions of the local authority. The probability for those who think polluted sea products are threatening to find the actions of the central authority satisfactory is 0.554 times less/weaker than those who do not consider polluted sea products threatening.

As for the variable of “*age*”, any rise of one unit in the age increases the probability of finding the actions of the central authority and the local authority satisfactory (1,019 and 1,018 times respectively). This same variable has no meaningful relationship with the actions of the ship authority. Likewise, the rise in education increases the probability of finding the actions of the central authority satisfactory (1,342 times). The “*education*” variable has no meaningful relationship with the actions of the local authority and ship authority.

The probability for those who trust in the news broadcast by TV to find the actions of the central authority satisfactory is 1,794 times greater than those who do not trust this news. This variable has no meaningful relationship with the actions of the local authority and ship authority. The probability for those who think of leaving Çeşme after the disaster to find the actions of the central authority satisfactory is 0.403 times less than those who do not think of leaving Çeşme.

The probability for those who have been affected by illegal fishing and seasonal changes to find the actions of the local authority satisfactory is greater than those who have not been affected by these two variables (1,432 and 1,424 times respectively).

The probability for those who trust the news broadcast by newspapers to find the actions of the local authority satisfactory is 1,816 times greater than those who do not trust this news. In terms of the “*gender*” variable, the probability for females to find the actions of the local authority satisfactory is 1,647 times greater than male. This variable has no meaningful relationship with the actions of the central authority. The probability of those who trust the views of scientists/academicians to find the actions of the local authority and ship authority satisfactory is greater than those who do not trust the views of scientists/academicians (respectively 1,719 and 1,560 times).

The probability for those who think coastal pollution is threatening to find the actions of the ship authority satisfactory is 0.575 times higher than those who do not consider this pollution threatening. As for the variable of “*family income*”, the higher the income gets the more favorable view on the actions of the ship authority. This probability is 0.690 times. Another finding is that probability for those who are employed in the tourism industry to find the actions of the ship authority satisfactory is 0.378 times lower than those who are not employed in the tourism industry. This variable has no meaningful relationship with the actions of the central authority and local authority.

6. MANAGERIAL IMPLICATIONS

Although disasters caused by oil spill are not desirable, they, unfortunately, do happen from time to time. Thus, proper actions to such mishaps are of great importance. The relevant parties are required to have their well-prepared action plans to overcome the suffering brought about by such disasters. It is undeniably crucial/critical that the relevant action plans are to be managed in integration and coordination with the residents of the district that has encountered such catastrophes. Such coordination is most likely to create favorable perceptions through the relevant residents that the responses to the danger have been effective. This coordination will also prevent the mishap from spreading further and getting worse.

The conclusions revealed through this study indicate that the actions taken to the mentioned disasters ought to provide all the related parties certain gains. Such gains should match at least the minimum perceptions of the relevant residents and also should produce certain results that could be felt in the short run.

As academicians, we hope not to witness such disasters but we also know that they could be unavoidable. The best thing we can do is to scientifically and academically scrutinize such happenings and shed light on what and how best to combat, prevent, and eliminate any less likely to be brought about by such catastrophes. Thus, we feel pleased to have carried out this study, but it should be kept in mind that researches on such important issues do need to involve multidisciplinary coordination, as they require contributions from various disciplines. Such coordination and resultant studies are most likely to create proactive approaches and prevent any likely disasters.

7. CONCLUSION

The responses to the questions regarding the marine environmental threats reveal that most of the participants perceive that “*coastal pollution*” and “*polluted sea products*” are basic threats, and they also consider the “*illegal fishing*” and “*tides brought about by the increase in the global warming*” quite important. The overall perceptions support the idea of protecting the marine environment. Likewise, the overall perceptions show that sensitivity and awareness regarding the oil spill discussed in this study are quite high.

The study has revealed that most of the participants are moderately informed about the oil spill suffered in Cesme. Besides, it has been found

out that almost half of the participants have been economically affected by the disaster encountered.

The findings reveal that the focus has been directed to the damages made on the environment and the natural life. In this respect, the overall perceptions are that the effects of the oil spill on the coast/shore and the natural life are not likely to get recovered and that even they can, it will take more than 10 years. Particularly for the fishing industry, this pessimistic view is around 60 %. Another worthwhile finding is the highest trust in the views of scientists/academicians and the lowest trust in the ship authority.

Perceptions regarding the actions of the central authority, local authority and ship authority to the disaster encountered, gained through logistics regression analysis, indicate that: there has been no variable having a meaningful relationship with the actions of all these three parties together. This might mean that the sample has made rational choices and evaluated each of these parties individually. The variable of "*age*", as in many social studies, has taken importance with a meaningful relationship with the central authority and local authority. Another variable attracting attention is "*employment in the tourism service industry*" with a meaningful relationship with the actions of the ship authority. Considering that most of the participants employed in the tourism industry are small sized (boat) operating business persons, their evaluations regarding the actions of the ship authority should be considered relatively more logical and conscious. Another point having attracted attention is the meaningful relationship between "*education*" and "*the evaluation regarding the actions of the central authority*". The higher the level of education gets the more favorable view regarding the actions of the central authority have been proper scientifically and technologically.

The most interesting point revealed by this study is the overall evaluation regarding the actions of the involved parties the evaluation places these parties in ranks in terms of success ranging from satisfactory to unsatisfactory as follows; local authority, central authority, and ship authority. As a further research suggestion, the study can be handled in geographically broader region in a national basis and can be performed as longitudinal study.

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REFERENCES

AFAD (Afet ve Acil Durum Yönetimi Başkanlığı). (2014). 2014-2023 Teknolojik Afetler Yol Haritası Belgesi. <https://www.afad.gov.tr/upload/Node/3906/xfiles/teknolojik-afetler-son.pdf>

Asyalı, E. and Kızılkapan, T. (2012). Türkiye Kıyılarında 2004-2008 Yıllarında Uluslararası Sefer Yapan Gemilerin Karıştığı Deniz Kazalarının Analizi. *Dokuz Eylül Üniversitesi Denizcilik Fakültesi Dergisi*. 4(2): 27-45.

Başar, E. (2010). M/V Strontsiy Gemi Kazası Sonrasındaki Dökülen Yakıt Dağılımının Benzetim Modeli. *Dokuz Eylül Üniversitesi Denizcilik Fakültesi Dergisi*. 2(1): 1-12.

CBS (T.C. Çevre ve Şehirlik Bakanlığı) (2017). Basın Açıklaması, LADY TUNA isimli gemi kazası sonrasında yapılan çalışmalar ve ÇEŞME denizlerimizin şu anki durumu. <http://www.csb.gov.tr/iller/izmir/index.php?Sayfa=haberdetay&Id=158245>

Çokluk, Ö. (2010). Lojistik regresyon analizi: Kavram ve uygulama. *Kuram ve Uygulamada Eğitim Bilimleri*, 10(3), 1357-1407.

Dirik, H. (2017). Lady Tuna daha da kirletecek!, Cumhuriyet 26 Nisan 2017 Çarşamba, http://www.cumhuriyet.com.tr/haber/cevre/728488/Lady_Tuna_daha_da_kirletecek_.html

Etkin, D. S. (2001). Analysis of oil spill trends in the United States and Worldwide. In *International Oil Spill Conference*. Vol. 2001, No. 2, 1291-1300. American Petroleum Institute.

Gill, D. A., Ritchie, L. A., Picou, J. S., Langhinrichsen-Rohling, J., Long, M. A. ve Shenesey, J. W. (2014). The Exxon and BP oil spills: a comparison of psychosocial impacts. *Natural hazards*, 74(3), 1911-1932.

Girginer, N. and Cankuş, B. (2008). Tramvay yolcu memnuniyetinin lojistik regresyon analiziyle ölçülmesi: Estram örneği. *Yönetim ve Ekonomi: Celal Bayar Üniversitesi İktisadi ve İdari Bilimler Fakültesi Dergisi*, 15(1), 181-193.

Gujarati, D. N. (1999). Temel Ekonometri (Translation. Ümit Şenesen, Gülay Günlük Şenesen). *Birinci Basım, İstanbul: Literatür Yayınları*.

Harahsheh, H. A. (2016). Oil Spill Detection and Monitoring of Abu Dhabi Coastal Zone Using Kompsat-5 Sar Imagery. *International Archives of the Photogrammetry, Remote Sensing & Spatial Information Sciences*, 41.

ITOPF (The International Tanker Owners Pollution Federation Limited). (2014), Effects of Oil Pollution on Social and Economic Activities. <http://www.itopf.com/knowledge-resources/documents-guides/document/tip-12-effects-of-oil-pollution-on-social-and-economic-activities/>

KAİK (Ministry of Transport and Infrastructure Accident Investigation Board). (2017). Report on the Marine Accidents resulting from the M/V LADY TUNA's Grounding, Report No: 32/DNZ-04/2017. http://www.ubak.gov.tr/BLSM_WIYS/KAIK/tr/Deniz_Rapor/20171221_120141_76347_1_76648.pdf

Kim, D., Yang, G. G., Min, S. and Koh, C. H. (2014). Social and ecological impacts of the Hebei Spirit oil spill on the west coast of Korea: Implications for compensation and recovery. *Ocean & Coastal Management*, 102, 533-544.

Kinney, T. C. and Taylor, J. R. (1996). *Marketing Research: An Applied Approach*. New York: McGRAW-HILL, Inc. Fifth Edition.

Küçükyıldız, M. (2014). "Petrol Tankeri Kazalarının Deniz Çevresine Etkileri ve Tazmin Sistemi", *Deniz Ticareti Genel Müdürlüğü*, 18-33.

Mong, M. D., Noguchi, K. and Ladner, B. (2012). Immediate psychological impact of the Deepwater Horizon oil spill: Symptoms of PTSD and coping skills. *Journal of Aggression, Maltreatment & Trauma*, 21(6), 691-704.

Özdamar, K. (2002). *Paket Programlar ve İstatistiksel Veri Analizi (Çok Değişkenli Analizler)*. 4. Baskı. Eskişehir: Kaan Yayınları.

Öztürk, B. and Oral, N. (2006). The Turkish Straits, Maritime Safety, Legal and Environmental Aspects, *Turkish Marine Research Foundation Publication*, 25, 120-123.

Ritchie, W. (1995). Maritime Oil Spills- Environmental Lessons and Experiences with Special Reference to Low-Risk Coastlines. *Journal of Coastal Conservation*, 1(1), 63-76. Retrieved from <http://www.jstor.org/stable/25098192>

Rung, A.L., Gaston, S., Oral, E., Robinson, W.T., Fonham, E., Harrington, D.J., Trapido, E. and Peters, E.S. (2016). Depression, mental distress, and domestic conflict among Louisiana women exposed to the Deepwater Horizon oil spill in the WaTCH study. *Environ Health Perspect*, 124(9), pp.1429-1435.

Safford, T. G., Ulrich, J. D. ve Hamilton, L. C. (2012). Public perceptions of the response to the Deepwater Horizon oil spill: Personal experiences, information sources, and social context. *Journal of environmental management*, 113, 31-39.

Smith, K., Hamerton, H., Hunt, S. and Sargisson, R. J. (2016). Local volunteers respond to the Rena oil spill in Maketū, New Zealand. *Kōtuitui: New Zealand Journal of Social Sciences Online*, 11(1), 1-10.

TUIK (Türkiye İstatistik Kurumu). (2017). Adrese Dayalı Nüfus Kayıt Sistemi. http://tuik.gov.tr/PreTablo.do?alt_id=1059.